

JC05 Rec'd PCT/PTO 20 MAR 2002

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

0430-0163P

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

10/088411

INTERNATIONAL APPLICATION NO.

PCT/EP00/09971

INTERNATIONAL FILING DATE

October 10, 2000

PRIORITY DATE CLAIMED

October 11, 1999

TITLE OF INVENTION

LIFT WITH A CAR ATTACHED TO A SUPPORT

APPLICANT(S) FOR DO/EO/US

WITTUR, Horst

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau. WO 01/28911
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
  - a. ☒ is transmitted herewith.
  - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4)
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 20. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98, Form PTO-1449(s), and International Search Report (PCT/ISA/210) with 0 cited document(s).
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821-1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:
  - 1.) Eight (8) sheets of Formal Drawings

U.S. APPLICATION NO (if known, see 37 CFR 1.5) <div style="font-size: 24pt; font-weight: bold;">10/088411</div>		INTERNATIONAL APPLICATION NO PCT/EP00/09971		ATTORNEY'S DOCKET NUMBER 0430-0163P	
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21. <input checked="" type="checkbox"/> The following fees are submitted: <b>BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5):</b> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. .... <b>\$1,040.00</b>  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... <b>\$890.00</b>  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO. .... <b>\$740.00</b>  International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... <b>\$710.00</b>  International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4). .... <b>\$100.00</b> <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>				<b>CALCULATIONS      PTO USE ONLY</b>	
				\$	890.00
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	130.00
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total Claims	16 - 20 =	0	X \$18.00	\$	0
Independent Claims	1 - 3 =	0	X \$84.00	\$	0
MULTIPLE DEPENDENT CLAIM(S) (if applicable)      None      + \$280.00				\$	0
<b>TOTAL OF ABOVE CALCULATIONS =</b>				\$	1020.00
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$	-510.00
<b>SUBTOTAL =</b>				\$	510.00
Processing fee of <b>\$130.00</b> for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	0
<b>TOTAL NATIONAL FEE =</b>				\$	510.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). <b>\$40.00</b> per property      +				\$	0
<b>TOTAL FEES ENCLOSED =</b>				\$	510.00
				Amount to be: refunded	\$
				charged	\$

a. ☒ A check in the amount of \$ 510.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account. No. \_\_\_\_\_ in the amount of \$ \_\_\_\_\_ to cover the above fees.  
 A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any  
 overpayment to Deposit Account No. 02-2448.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

Send all correspondence to:  
**Birch, Stewart, Kolasch & Birch, LLP** or Customer No. 2292  
**P.O. Box 747**  
**Falls Church, VA 22040-0747**  
**(703) 205-8000**

**Date: March 20, 2002**

By   
 James M. Slattery, #28,380  
 F61 #43,368

10/088411

JC10 Rec'd PCT/PTO 2.0 MAR 2002

PATENT  
0430-0163P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: WITTUR, Horst  
Int'l. Appl. No.: PCT/EP00/09971  
Appl. No.: New Group:  
Filed: March 20, 2002 Examiner:  
For: LIFT WITH A CAR ATTACHED TO A  
SUPPORT

PRELIMINARY AMENDMENT

**BOX PATENT APPLICATION**

Assistant Commissioner for Patents  
Washington, DC 20231

March 20, 2002

Sir:

The following Preliminary Amendments and Remarks are respectfully submitted in connection with the above-identified application.

**AMENDMENTS**

**IN THE TITLE:**

Please amend the title to read as follows:

--LIFT WITH A CAR ATTACHED TO A SUPPORT--

**IN THE SPECIFICATION:**

Please amend the specification as follows:

Before line 1, insert --This application is the national phase under 35 U.S.C. § 371 of PCT International Application No.

Docket No. 0430-0163P

PCT/EP00/09971 which has an International filing date of October 10, 2000, which designated the United States of America.--

IN THE CLAIMS:

Please amend the claims as follows:

3. (Amended) The elevator as defined in claim 1, characterized in that the width of said drive motor (6) including the pulley (6a) supported by it in axial direction does not exceed the width of said drive wheel (5) also in axial direction thereof.

4. (Amended) An elevator as defined in claim 1, characterized in that said drive motor (6) is a disc armature motor.

5. (Amended) An elevator as defined in claim 1, characterized in that said drive motor (6) at least partly is arranged within said pulley (6a) supported by it.

6. (Amended) An elevator as defined in claim 1, characterized in that said drive motor (6) is an external rotor motor whose rotor outside is constructed as pulley (6a) for said at least one drive belt (15).

7. (Amended) An elevator as defined in claim 1, characterized in that said hub (17) supporting said sheave profile (16) in total is made in one piece.

8. (Amended) An elevator as defined in claim 1, characterized in that said hub (17) supporting said sheave profile (16) and said circumferential frictional surface (10) of said brake are made in one piece

9. (Amended) An elevator as defined in claim 1, characterized in that said hub (17) supporting said sheave profile (16), said circumferential frictional surface (10) of said brake and said pulley (9) are made in one piece.

10. (Amended) An elevator as defined in claim 1, characterized in that said pulley (9) protrudes over said sheave (16,17), wherein said pulley (9) can be embodied in a manner bent at right angel for forming a room for accommodating a brake means (18,19), i.e. consists of an inner section (9b) bent at right angle and a disc-shaped section (9c) following in radially outward direction, supporting on its outer circumference a wheel rim (9a) onto which act said drive belts.

11. (Amended) An elevator as defined in claim 1, characterized in that said section (9b) bent at right angle on

its outer side (seen from its axis of rotation) forms the circumferential frictional surface (10) of a drum brake.

12. (Amended) An elevator as defined in claim 1, characterized in that said section (9b) bent at right angles comprises an circumferential extension (9d) forming the circumferential frictional surface of a brake drum, said extension (9d) seen in axial direction protrudes over the outermost rim of said wheel rim (9a).

13. (Amended) An elevator as defined in claim 1, characterized in that said wheel rim (9a) onto which act said drive belts on its inner side (seen from its axis of rotation) forms the circumferential frictional surface (10) of a drum brake.

14. (Amended) An elevator as defined in claim 1, characterized in that said flat band (8) consists of steel, of synthetic material or of a combination of synthetic material and steel.

15. (Amended) An elevator as defined in claim 1, characterized in that said axis of rotation (12) of said drive wheel (5) is arranged in said guide plane (25) of said vertical guide rails (24) correlated to the vertical long central place of said elevator cage.

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16. (Amended) An elevator as defined in claim 1, characterized in that the speed of said drive wheel (9) is geared down with respect to the speed of said drive motor (6) and said cage is suspended on said support in block (i.e. at least in a ratio 2:1).

Docket No. 0430-0163P

**REMARKS**

The specification has been amended to provide a cross-reference to the previously filed International Application.

The claims have been amended to delete improper multiple dependencies and to place the application into better form for examination. The title has been amended to correspond with the declaration. Entry of the above amendments is earnestly solicited. An early and favorable first action on the merits is earnestly solicited.

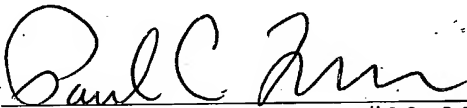
Attached hereto is a marked-up version of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By



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JMS/cqc  
0430-0163P

Attachment: VERSION WITH MARKINGS TO SHOW CHANGES MADE

(Rev. 02/21/02)



VERSION WITH MARKINGS TO SHOW CHANGES MADE

The title has been amended as follows:

[ELEVATOR]LIFT WITH A [CAGE HELD ON]CAR ATTACHED TO A  
SUPPORT

The claims have been amended as follows:

3. (Amended) The elevator as defined in [one of the preceding claims]claim 1, characterized in that the width of said drive motor (6) including the pulley (6a) supported by it in axial direction does not exceed the width of said drive wheel (5) also in axial direction thereof.

4. (Amended) An elevator as defined in [one of the preceding claims]claim 1, characterized in that said drive motor (6) is a disc armature motor.

5. (Amended) An elevator as defined in [one of the preceding claims]claim 1, characterized in that said drive motor (6) at least partly is arranged within said pulley (6a) supported by it.

6. (Amended) An elevator as defined in [one of the preceding claims]claim 1, characterized in that said drive motor (6) is an

external rotor motor whose rotor outside is constructed as pulley (6a) for said at least one drive belt (15).

7. (Amended) An elevator as defined in [one of the preceding claims]claim 1, characterized in that said hub (17) supporting said sheave profile (16) in total is made in one piece.

8. (Amended) An elevator as defined in [one of the preceding claims]claim 1, characterized in that said hub (17) supporting said sheave profile (16) and said circumferential frictional surface (10) of said brake are made in one piece

9. (Amended) An elevator as defined in [one of the preceding claims]claim 1, characterized in that said hub (17) supporting said sheave profile (16), said circumferential frictional surface (10) of said brake and said pulley (9) are made in one piece.

10. (Amended) An elevator as defined in [one of the preceding claims]claim 1, characterized in that said pulley (9) protrudes over said sheave (16,17), wherein said pulley (9) can be embodied in a manner bent at right angel for forming a room for accommodating a brake means (18,19), i.e. consists of an inner section (9b) bent at right angle and a disc-shaped section (9c) following in radially outward direction, supporting on its outer circumference a wheel rim (9a) onto which act said drive belts.

11. (Amended) An elevator as defined in [one of the preceding claims]claim 1, characterized in that said section (9b) bent at right angle on its outer side (seen from its axis of rotation) forms the circumferential frictional surface (10) of a drum brake.

12. (Amended) An elevator as defined in [one of the preceding claims]claim 1, characterized in that said section (9b) bent at right angles comprises an circumferential extension (9d) forming the circumferential frictional surface of a brake drum, said extension (9d) seen in axial direction protrudes over the outermost rim of said wheel rim (9a).

13. (Amended) An elevator as defined in [one of the preceding claims]claim 1, characterized in that said wheel rim (9a) onto which act said drive belts on its inner side (seen from its axis of rotation) forms the circumferential frictional surface (10) of a drum brake.

14. (Amended) An elevator as defined in [one of the preceding claims]claim 1, characterized in that said flat band (8) consists of steel, of synthetic material or of a combination of synthetic material and steel.

16. (Amended) An elevator as defined in [one of the preceding claims]claim 1, characterized in that the speed of said drive wheel (9) is geared down with respect to the speed of said drive motor (6) and said cage is suspended on said support in block (i.e. at least in a ratio 2:1).

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Elevator with a cage held on a support

The invention relates to an elevator with an elevator cage held on a support, in accordance with the preamble of claim 1.

In the past years elevators for buildings have been developed which can do without an additional machine room for elements of the support and motion unit of the elevator cage. With respect thereto, a drives are known which in flat manner bear on the shaft wall and find room in a lateral area between said wall and the elevator cage.

Motors of this kind are embodied in gearless manner or with the use of special flat-built gears. Such constructions represent special constructions which are connected with correspondingly high cost.

Furthermore, from the German utility model DE 298 65 26 U1 an elevator drive is known, consisting of a pulley and a sheave coaxially correlated thereto, which are combined to form a flat drive wheel connected to the drive motor via a belt drive. By the belt drive a spatial separation is achieved between the pulley acting on the support ropes and a drive motor correlated thereto and effecting movement thereof, so that the drive motor can be arranged in favorable position spaced from said sheave, this permitting a more flexible adaptation to the local conditions.

Since, however, the possibility to realize transmissions to slower movement by means of a one-step belt drive is limited, a drive motor with comparatively strong torque is required. If it is to be done without using a particularly flat-built and costly special construction for the drive motor and instead rather a standard motor is to be used, this obligatorily requires that the motor is built so large that its width in direction of its drive shaft is larger than the width of the drive wheel along the axis of rotation thereof.

In other words it cannot be avoided that the motor laterally protrudes over said drive wheel and the frame holding said drive wheel, into the elevator shaft.

This results in that the drive wheel can be accommodated between the shaft wall and the lifting passage passed by the elevator cabin and/or its elongation to bottom or top, however, the motor does not find sufficient room between the shaft wall and the lifting passage passed by the elevator cabin and/or its elongation to bottom or top on the side where the drive wheel is located. This obligatorily causes a restriction in flexibility of possible arrangeability of the motor. Correspondingly, the utility model cited in the beginning provides for that the motor is arranged in a pocket-like area above the shadow space of a door fighter profile or below the lower frame profile of a door.

Therefore, the present invention is based on the object of creating a holding and drive unit integrated into the elevator shaft, for an elevator cage, in which in spite of the use of a traditional drive motor an almost arbitrary arrangeability of the drive motor in the shaft is guaranteed.

The invention solves this object by means of an elevator whose support consists of at least one flat belt or synthetic rope which is directly wound around a part of the hub of the drive wheel, which part in the corresponding position has a sleeve-like section showing the required sheave profile. While the curve of traditional steel ropes during their deflection by means of a sheave must not be smaller than a given, not unsubstantial curve radius since otherwise the bending stress occurring in the steel ropes exceeds the maximally admissible limit for the demanded fatigue strength, flat belts or synthetic ropes can be guided over a sheave with a substantially smaller curve radius. Thereby it becomes possible to realize the sheave with a very small outer diameter by winding the flat belt directly

around the hub of the drive wheel. Due thereto in case of unchanged load of the support belt smaller torques occur on the sheave. The torque to be demanded from the drive motor decreases. Correspondingly, no motors can be used which also as standard motors are built sufficiently compact for allowing to be accommodated in very different positions in the elevator shaft.

Therein, it is particularly advantageous that now a drive motor of such size can be used whose width (including the pulley supported thereby) does not exceed the width of the drive wheel in axial direction. Thus, the drive motor can be accommodated on the same side as the drive wheel between the shaft wall and the lifting passage passed by the elevator cabin and/or its elongation to bottom or top.

Preferably, the drive motor at least partly is arranged within the pulley supported by it. This becomes possible as the pulley due to the lower drive speed to be created on said drive wheel can be embodied with a somewhat larger diameter, so that within the pulley sufficient room results for motor components. Thereby, additional constructional space is available for the motor.

In accordance with a further preferred embodiment the drive motor is an external rotor motor whose rotor outside is designed as pulley for the at least one drive belt. In such a construction the pulley does not require additional constructional space in axial direction of the motor, this again simplifying use of a standard motor.

An advantages further development provides for that the hub supporting the sheave profile is made in one piece. This includes the advantage that a separate sheave and thus an additional component causing costs and assembly time can be saved.

Preferably, the hub supporting the sheave profile, the circumferential frictional surface of the brake and the drive belt pulley are made in one piece. This saves further individual components causing additional costs. The drive wheel can, if required, be manufactured in rational manner and in a clamping by cutting operation from a precast or prewelded blank. The necessity of mutually centering individual components of the drive wheel quick running in accordance with the present invention, can be done without.

In particularly advantageous manner the pulley is embodied bent at right angle for forming an accommodation space for a braking means, i.e. it is composed of an inner section bent at right angle and a disc-shaped section subsequent thereto in radially outward direction, which has a wheel rim on its outer circumference, onto which act the drive belts. Thereby an annular accommodation room for the stationary components of a brake is created. The latter than will no longer protrude over the outer dimensions of the drive wheel.

If in advantageous manner in addition the section bent at right angle, on its outside forms the circumferential frictional surface of a drum brake or as alternative thereto the wheel rim onto which act the drive belts on its inside forms the circumferential frictional surface of a drum brake, the requirement to have to dispose an additional brake disk or brake drum on the hub can be done without. The constructional space additionally available thereby on the hub in axial direction is in particular in favor of the width of the drive belt.

By combining pulley and sheave with integration of the circumferential frictional surface of the brake to form a drive wheel a particularly flat unit can be manufactured which e.g. can also be arranged behind a



lateral vertical guide rail.

Further advantages and details result from the embodiments of the subject matter of the invention, shown in the drawing. The drawings shows the following:

FIG. 1 a longitudinal section through a shaft head in case of arrangement of the drive wheel and the drive motor in the shaft head region;

FIG. 2 a section along the line III – III in FIG. 1;

FIG. 3 a section along the line IV – IV in FIG. 1;

FIG. 4 the detail V from FIG. 1;

FIG. 5 a modification of FIG. 1, in which the motor was accommodated in an alternative position in the shaft head, using its now smaller structural size;

FIG. 6 a section of a constructional modification of the drive wheel;

FIG. 7 a section of a further constructional modification of the drive wheel;

FIG. 8 a further modification of FIG. 1, in which the motor was accommodated in an alternative position in the area of the lower shaft end, using its now smaller structural size;

FIG. 9 a last modification of FIG. 1, in which the motor was accommodated in an alternative position in the area of the lower shaft end, using its now smaller structural size.

In FIGs. 1 to 4 a first embodiment of the elevator 1 in accordance with the present invention, said elevator having a vertical shaft 2 for up- and downward movements of an elevator cabin 3. In the head section 4 of said shaft 2 the elevator drive consisting of a drive wheel 5 as well as a drive motor 6 acting thereon is arranged, wherein said drive, if required, of

course can also be accommodated in other positions in said shaft. Said drive motor 6 is embodied as external rotor motor, whose rotor outside in sections is realized as pulley for three parallel drive belts. Said shaft 2 is closed on top and on bottom and does not comprise a separate machine room.

The clear cross-section of said shaft is substantially larger than the cross-section of said elevator cabin, so that across the direction of movement of said elevator cabin on all sides a gap exists between said shaft wall and the passage passed by said elevator cabin.

Said drive wheel 5 has a hub 17 profiled as sheave (16) in one section. Over said section a flat belt 8 is wound. On said flat belt said elevator cabin 3 is suspended. Said flat belt 8 effects the lifting and lowering movements of said elevator cabin by running over the correspondingly driven sheave.

In addition said sheave 5 comprises a pulley 9 supporting a wheel rim 9a on its outermost diameter, on whose outside drive belts 15 act. The inside of said wheel rim 9a is the frictional surface 10 of a brake drum formed by said wheel rim 9a. Brake shoes press in known manner (not shown in the Figs. in all details) on said frictional surface. Said brake shoes in the embodiments under FIGs. 1 to 4 are pressed to the inner surface of said wheel rim 9a by correspondingly pre-tensioned springs radially to the outside. During operation suitable brake cylinders (e.g. actuated hydraulically) hold said brake shoes in elevated position against the spring pre-tension.

Said pulley 9 and said sheave integrated into said hub 17 as well as said circumferential frictional surface 10 of said brake (no matter whether said frictional surface 10 now – as shown in this embodiment – is

integrated into said pulley 9 or is made available by a separately designed component like a brake disk 21) are combined to form a flat-structured drive wheel 5. Said drive wheel 5 is supported on a support frame 11 about a locally stable axis of rotation 12. To said support frame 11 a link 13 is connected, which carries said drive motor 6, said link 13 being charged via a tensioning spring 14 with a force which in the sense of tensioning the drive belt or belts 15 acts on said line 13. Of course, as tensioning spring not only the mechanical spring shown here comes into consideration but various known tensioning elements including hydraulically acting tensioning means.

Said axis of rotation 12 of said drive wheel 5 is arranged in the guide plane 25 of vertical guide rails 24 which are correlated to the vertical long central plane of said elevator cage 3 (FIG. 3). Said support frame 11 can be arranged in the space between said guide rail 25 and a lateral shaft wall 26 in room-saving manner.

In the embodiment represented by FIGs. 1 to 4 the shaft (not having an own reference number) of said drive motor 6 is arranged in parallel to the plane 20 (see FIG. 2) of doors 21 blocking admission to the shaft by stores. As it is a matter of a fast running drive motor which due to its high-speed capacity provides the required output also as comparatively small-size unit, said motor does not protrude over the plane 22 (see FIG. 2), i.e. over the plane created by the side of said support frame 11, facing the cabin, in direction of said elevator cabin.

Said motor 6 held on its outer circumference by means of said link 13, therefore, in the construction in accordance with the present invention need not be located above said door fighter profile 22, as shown in Fig. 1. Since due to the fact that said motor in the construction in accordance with the present invention does no longer protrude over said plane

22, now – if required – also said motor finds sufficient room on the same side as said drive wheel between said shaft wall and said movement passage of said elevator cabin and/or the virtual elongation of said passage to top or bottom. As is elucidated by the embodiment shown in FIG. 5, said motor (for example) can also be arranged by means of a corresponding link below the horizontally extending part of said support frame 11 in – with respect to FIG. 2 – right-hand side gap between said movement passage of said elevator cabin and said shaft wall closely above said door opening. Said motor in case of maintenance is better accessible in this position a.o.

As is elucidated by the embodiment modification shown in FIG. 8, the motor (also only as example) can be arranged also by means of a corresponding link closely above said shaft bottom between said guide rail and said shaft wall. In FIG. 8 a corresponding guide rail is shown in broken form for better survey. Said engine is located behind it and behind the continuation of said guide rail indicated in dots, seen from the point of view of the drawing plane.

In accordance with the modification shown in FIG. 9 said motor can also be arranged on the opposite side as compared to FIG. 8, below the threshold of said shaft door.

FIG. 4 as detail V (see marking of detail V in FIG. 1) shows the design of said drive wheel, its frame and said motor mounted thereon in more detail. The half of FIG. 4 lying above said bearing pin and/or said axis 13 shown a semisection (seen from top), the half of FIG. 4 lying below said bearing pin shows a top view, also seen from top.

It can be seen how said motor 6 embodied as external rotor motor with a pulley 6a arranged on its rotor outside is held on said frame 11

of said drive wheel via a link 13. Said drive wheel 5 is driven via three V-belts 15 acting in parallel. Said V-belts 15 are shown in broken view in the area of connection of said link 13, in order to release a view onto the connection of said link 13. Said hub 17 of said drive wheel 5 is supported on said bearing pin 12 representing the axis of rotation of said drive wheel and on both sides bearing on said support frame 11, via two rolling bearings.

Said elevator cabin is held and moved by flat belts 8. Said flat belt 8 is directly wound around said hub 17 which for this purpose on the position of winding has a section 16 comprising the required sheave profile for save accommodation of a flat belt. When using a flat belt 8 profiling essentially consists of two board-shaped protrusions arranged on both sides. As a rule said drive belt on its inside is sufficiently fictively (in any case if it is a matter of a synthetic surface), so that no particular rope grooves or the like have to be provided for in order to reliably avoid slipping of said flat belt. The section of winding 16 by said flat belt 8, of said hub 17 therein is embodied like a sleeve in the sense that a wheel rim representing a sheave in traditional sense, which is connected with the very hub via spokes or via a wheel disc as radial intermediate member and thus has a correspondingly large outer diameter is done without. Rather is the belt wound around a diameter of said hub located as close as possible to said axis of rotation. Said hub in this area is embodied with a wall thickness adequate with respect to points of view of strength and common increased factor of safety. Thus, the outer diameter of said sheave profile, which is in contact with said drive belt is essentially oriented on the outer diameter of (at least) the bearing located closest to said sheave profile. It is particularly advantageous to make the outer diameter of the profile being in contact with said drive belt not larger than appx. with a diameter corresponding to the 2 ½ fold outer diameter of the corresponding bearing.

As in this matter the drive belt force attack via a comparatively small lever arm on said sheave, in this construction the motor torque required for the drive is reduced.

In spite of the fact the a support belt 8 as compared to a traditional support rope needs an increased constructional place in parallel to its rolling axis, this does not result in that said drive wheel obligatorily and in disadvantageous manner has a broader construction in axial direction. Since due to the fact that a motor running more quickly running and correspondingly having a weaker torque can be used, also the demands to the belts connecting the motor and the drive pulley decrease – the pulling forces to be transmitted by the belts at simultaneous power flow substantially decrease with increasing speed. As a consequence it becomes possible to use narrower belts 15, thereby at least a great portion of the structural room additionally required for said drive belt 8 in axial direction is available.

In the embodiment shown in FIG. 4 said pulley 9 is slipped on a lateral flange of said hub 17 and there is secured in rotationally stable manner by means of a feather key e.g. and is axially fixed in traditional manner. Alternatively, said hub and said drive pulley are made in one piece from a precast or prewelded blank. This option is favored in that a flat belt or synthetic ropes in contrast to steel ropes do not wear said sheave (and/or the rope grooves possibly required there) and for this reason it no longer is obligatory that said sheave can be exchanged individually.

In the embodiment shown in FIG. 4 said wheel rim 9 a supporting said V-belts 15 on said drive pulley 9 is built such that on its inside he makes available for a brake drum said frictional surface 10. Said brake lining 19 held on a pin 18 can be pressed to the outside against said fric-

tional surface by an hydraulic or mechanical brake actuation mechanism. This construction includes the advantage that the braking forces attack at a very large lever arm, this being the reason why also in case of comparatively low actuation forces or a comparatively low dimensioned brake mechanism comparatively large braking moments can be realized.

FIG. 6 shows the area close to the axis, of a modified drive wheel construction. Components of identical function are denominated with identical reference numerals as in the preceding figures.

On said bearing pin 12 of said drive wheel 9 said hub 17 of said drive wheel 9 is supported by bearing 14. Said hub 17 carries a sheave profile 16 for a flat belt 8. Here, too, said flat belt is wound around a area located as close as possible to the axis, i.e. essentially predefined by the outer diameter of said bearings 15 and the wall thickness of said hub.

Said drive pulley 9 here, too, consists of an inner section 9a bent at right angle, which is followed by a disc-shaped section 9c which on its outer circumference carries said wheel rim 9a onto which act said drive belts 15. Said section bent at right angle here now is provided with a drum-shaped circumferential extension 9d. In this manner a brake drum results onto which brake shoes 19 can be pressed from the outside.

This modification has the following advantage. As already mentioned above, the comparatively low load of said belts 15 because of the reduced sheave diameter permits the use of comparatively narrow belts, this also resulting in a comparative narrow construction of said wheel rim 9a of said drive pulley. In addition, said sheave bears on an essentially smaller diameter than the outer diameter of said brake drum, i.e. the outer diameter of said extension 9d. Due thereto, it becomes possible that said brake shoes 19 protrude in axial direction laterally over said drive pulley 9

without being hidden in this area laterally by said sheave. This opens the possibility to actuate said brake shoe laterally past said wheel rim using a traditional jaw-like brake linkage and keep it in elevated position during operation. The oil or hydraulic pump for an hydraulic actuation otherwise to be accommodated in the shaft and in addition also being expensive can be done without, this also bringing about essential advantages. Said brake drum and/or said extension 9d therein are dimensioned so broad in advantageous manner that the torque caused by the asymmetric attach of the actuation force FBREMS which in tendency tilts said brake shoe is intercepted by said frictional surface 10.

FIG: 7 shows a narrow section of said drive wheel of a further constructional modification. Components of identical function again are denominated with reference numerals identical to reference numerals as used for the corresponding components precedingly.

On said bearing pin 12 here, too, a hub 17 is supported by bearing 14. Said hub 17 here again in an area close to the axis, essentially defined by the outer bearing diameter and the full thickness of said hub carries a sheave profile 16 which here to is designed for receiving a flat belt 8. As a flat belt practically does not cause any wear in sheaves, it is possible to make said hub 17 at least in one part with said brake disc 21, possibility even with said drive sheave 9.

Brake linings 19 which under pretensioning are pressed against said brake disk and in operation are held in elevated position (preferably hydraulically), held in a brake caliper 20 act on said brake disk.

If in the individual embodiments an hydraulic brake actuation is provided for, a pressure agent reservoir (not shown) is installed so that also upon failure of a pump supplying said pressure agent, e.g. in case of



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failure of electric supply, aeration of said brake is possible manually. Thereby, said elevator cage 3 can be moved into an arbitrary position, e.g. for salvage purposes e.g..

## WHAT IS CLAIMED

1. An elevator (1) with a cage (3) held on a support (8), which is movable in upward and downward directions in a vertically extending shaft (2) by means of a drive motor (6) acting on said support (8) via a sheave (7) and being arranged in said shaft (2), said drive motor via at least one drive belt (15) acting on a pulley (9) arranged in parallel-axial manner, said pulley being combined with said sheave (7) coaxially correlated thereto to form a flat drive wheel (5), the circumferential frictional surface (10) of a brake being integrated into said drive wheel (5), characterized in that  
said support (8) consists of at least one flat band or synthetic rope which is directly wound around a part of said hub (17) of said drive wheel (5), said part on the corresponding position having a section showing the required sheave profile and thus forming said sheave (7).
2. The elevator as defined in claim 1,  
characterized in that  
the outer diameter of said surface wound of said sheave profile essentially corresponds to the outer diameter of said bearing (14) closest to said sheave profile (6), plus twice the amount of the wall thickness meaningful with respect to stability and stiffness aspects in this area, of the here sleeve-like section of said hub (17).
3. The elevator as defined in one of the preceding claims,  
characterized in that the width of said drive motor (6) including the pulley (6a) supported by it in axial direction does not exceed the width of said drive wheel (5) also in axial direction thereof.



made in one piece.

10. An elevator as defined in one of the preceding claims, characterized in that  
said pulley (9) protrudes over said sheave (16, 17), wherein said pulley (9) can be embodied in a manner bent at right angle for forming a room for accommodating a brake means (18, 19), i.e. consists of an inner section (9b) bent at right angle and a disc-shaped section (9c) following in radially outward direction, supporting on its outer circumference a wheel rim (9a) onto which act said drive belts.
11. An elevator as defined in one of the preceding claims, characterized in that  
said section (9b) bent at right angle on its outer side (seen from its axis of rotation) forms the circumferential frictional surface (10) of a drum brake.
12. An elevator as defined in one of the preceding claims, characterized in that  
said section (9b) bent at right angles comprises an circumferential extension (9d) forming the circumferential frictional surface of a brake drum, said extension (9d) seen in axial direction protrudes over the outermost rim of said wheel rim (9a).
13. An elevator as defined in one of the claims 1 to 10, characterized in that  
said wheel rim (9a) onto which act said drive belts on its inner side (seen from its axis of rotation) forms the circumferential frictional surface (10) of a drum brake.

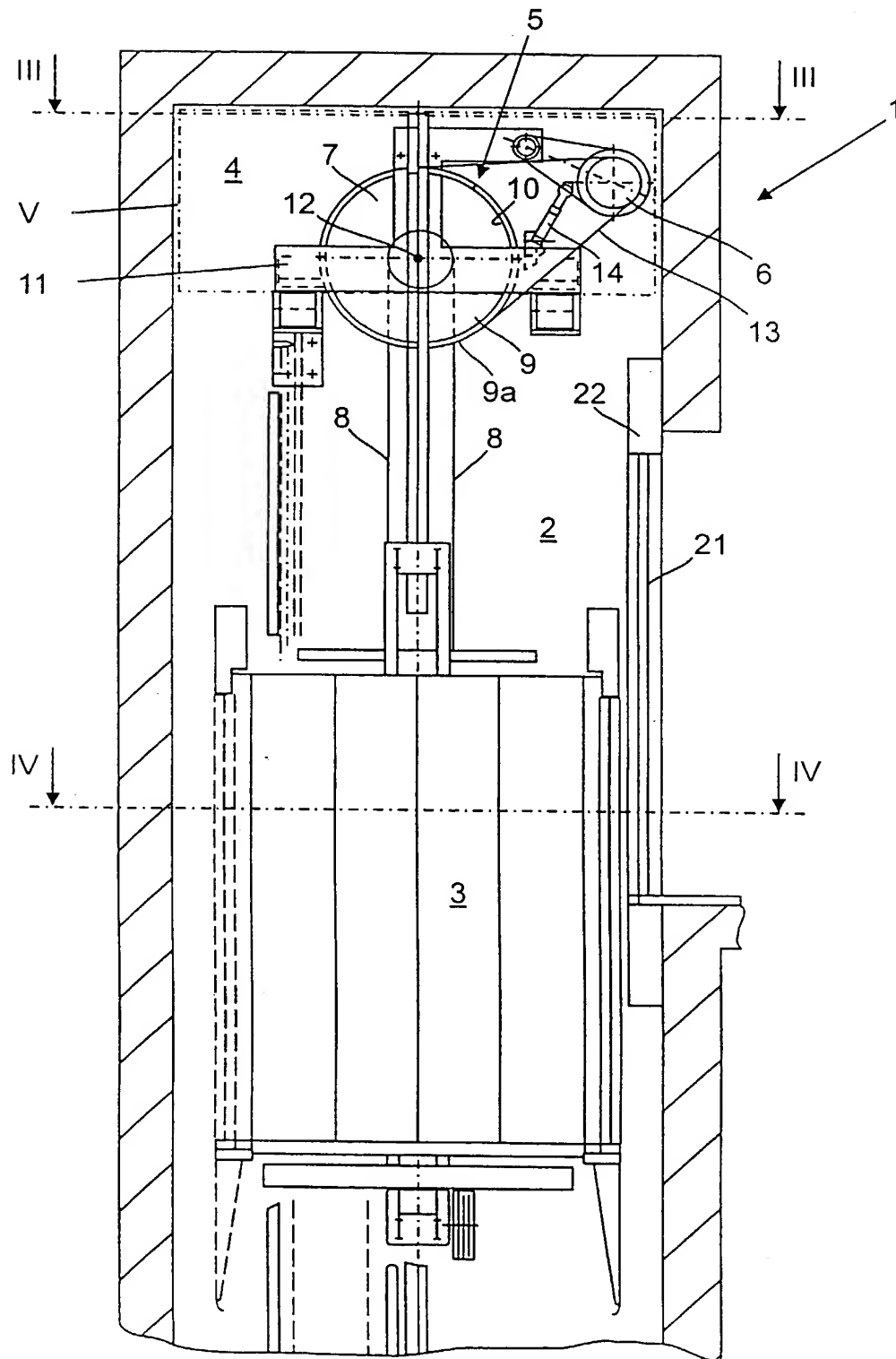


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## ABSTRACT

Drive for an elevator held on a support, to be arranged completely and flexibly with respect of its positioning in an elevator shaft, wherein said motor torque is transferred to a flat drive wheel via a belt gearing and said support of said elevator consists of a flat band or a synthetic rope directly wound around a part of the hub of said sheave.



**Fig. 1**

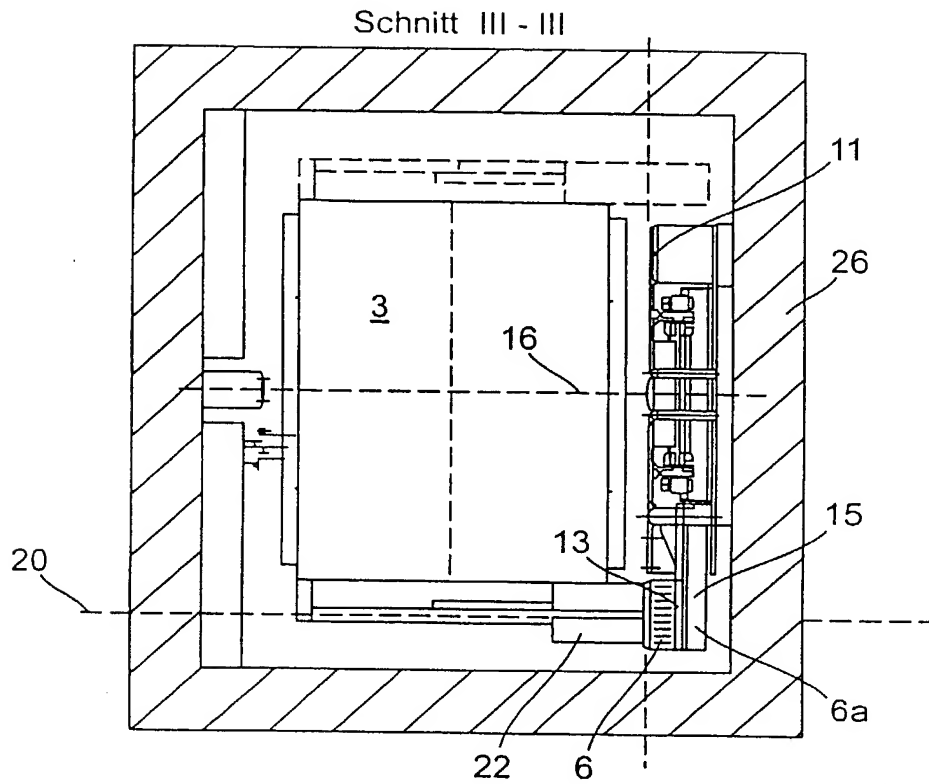


Fig. 2

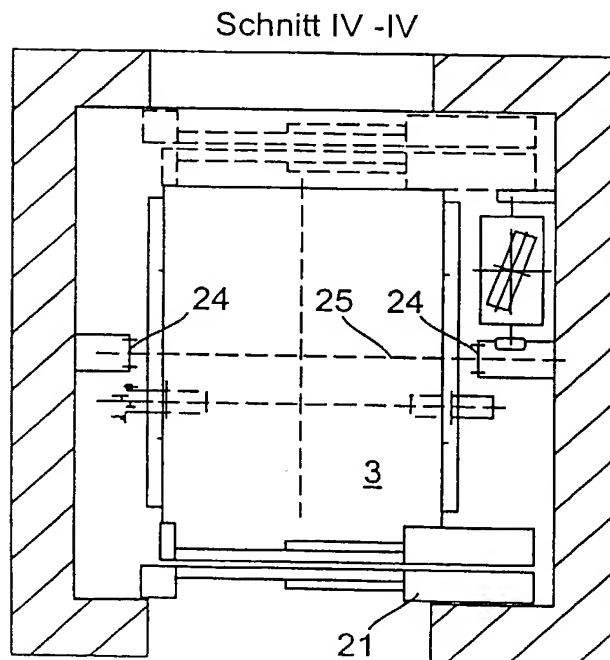


Fig. 3



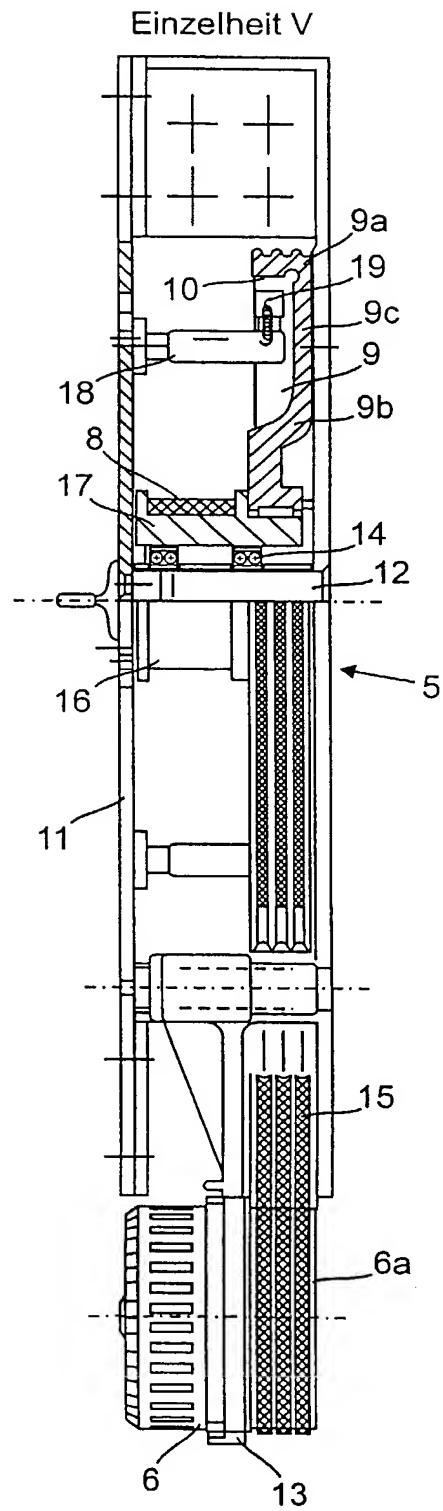


Fig. 4

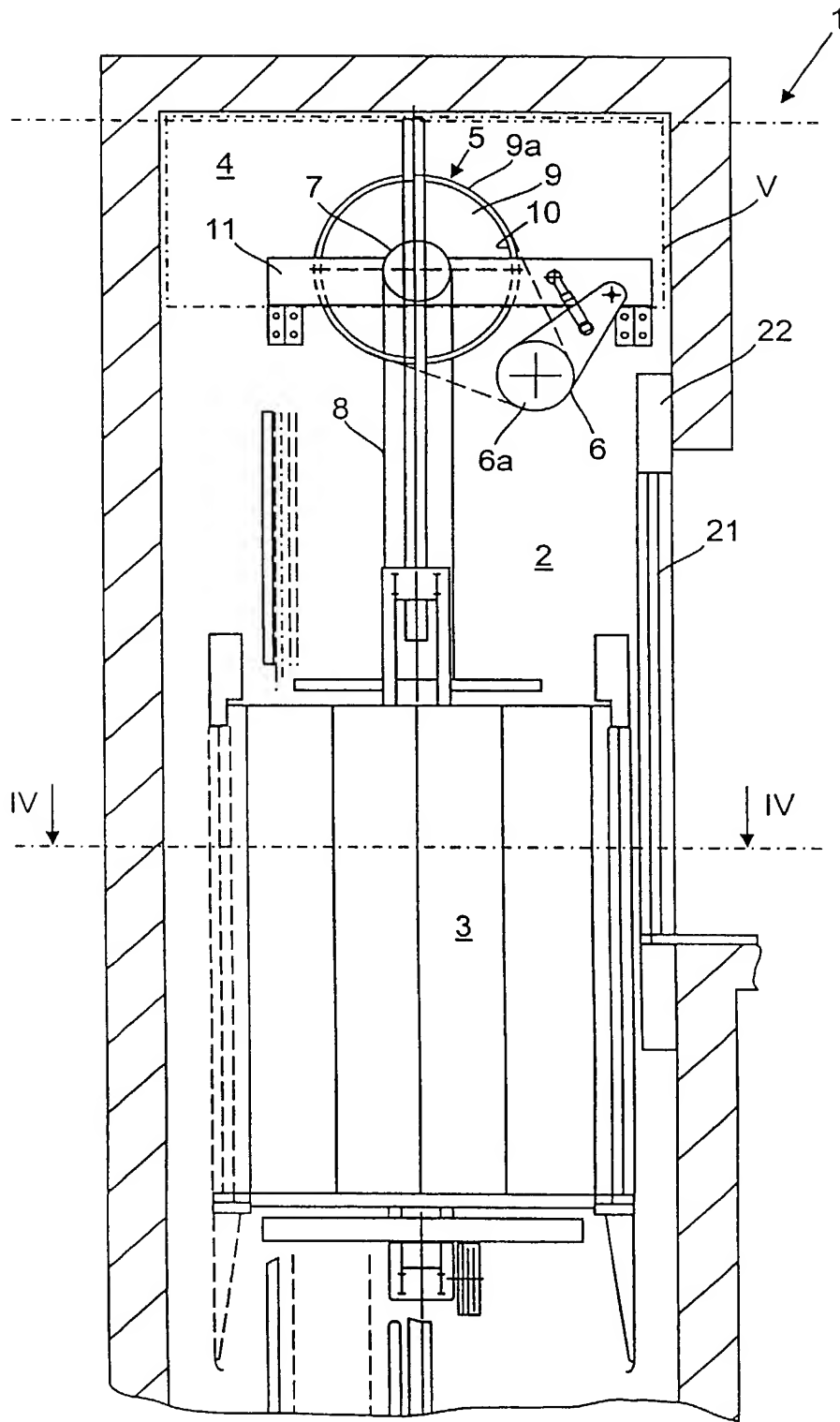


Fig. 5

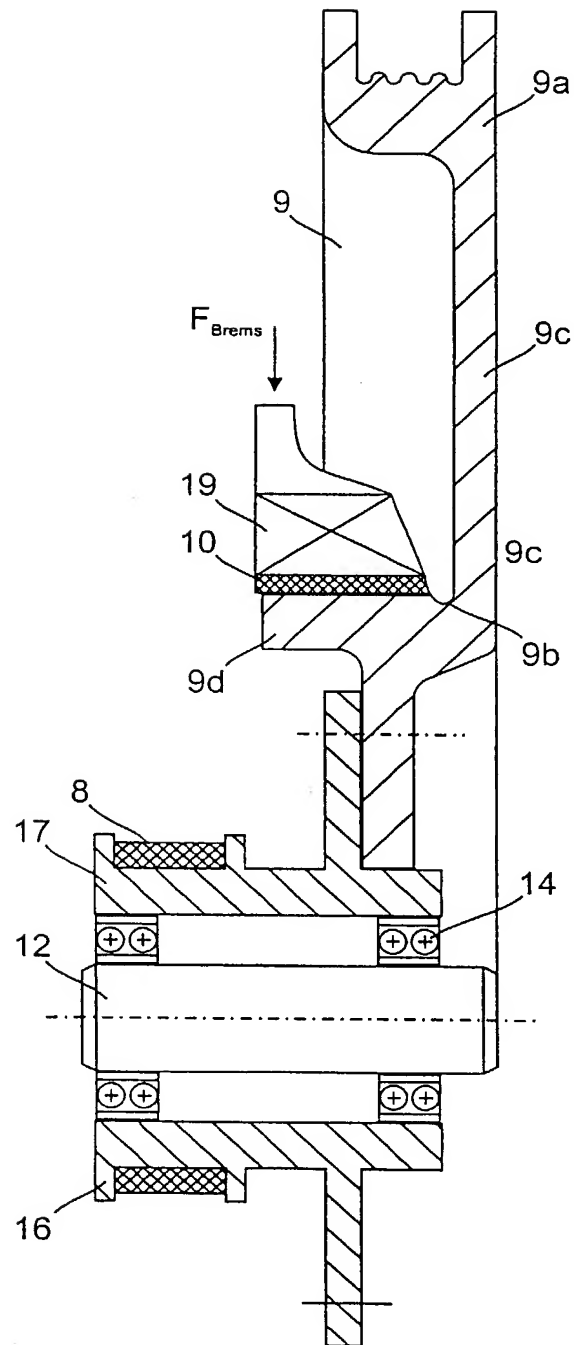


Fig. 6

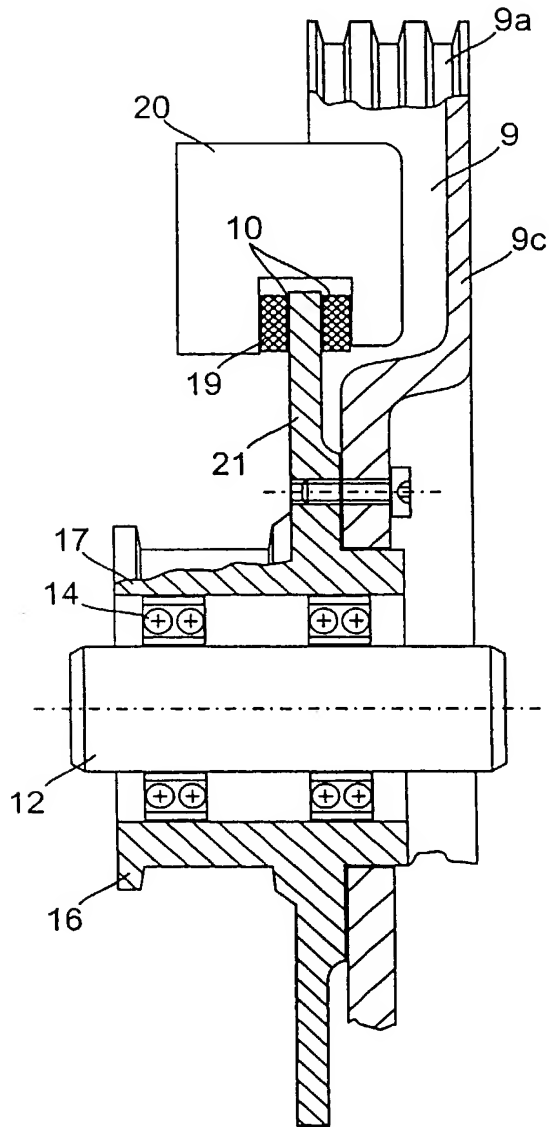


Fig. 7

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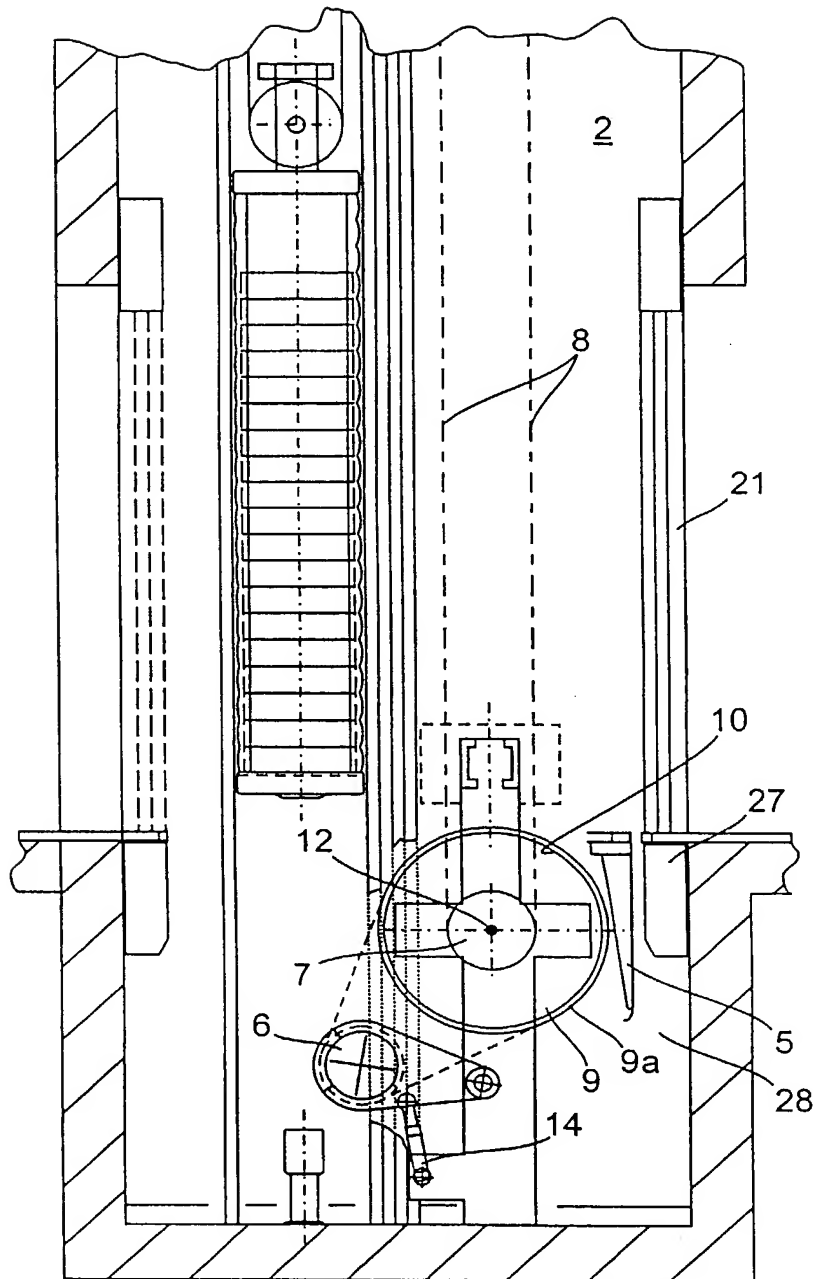


Fig. 8

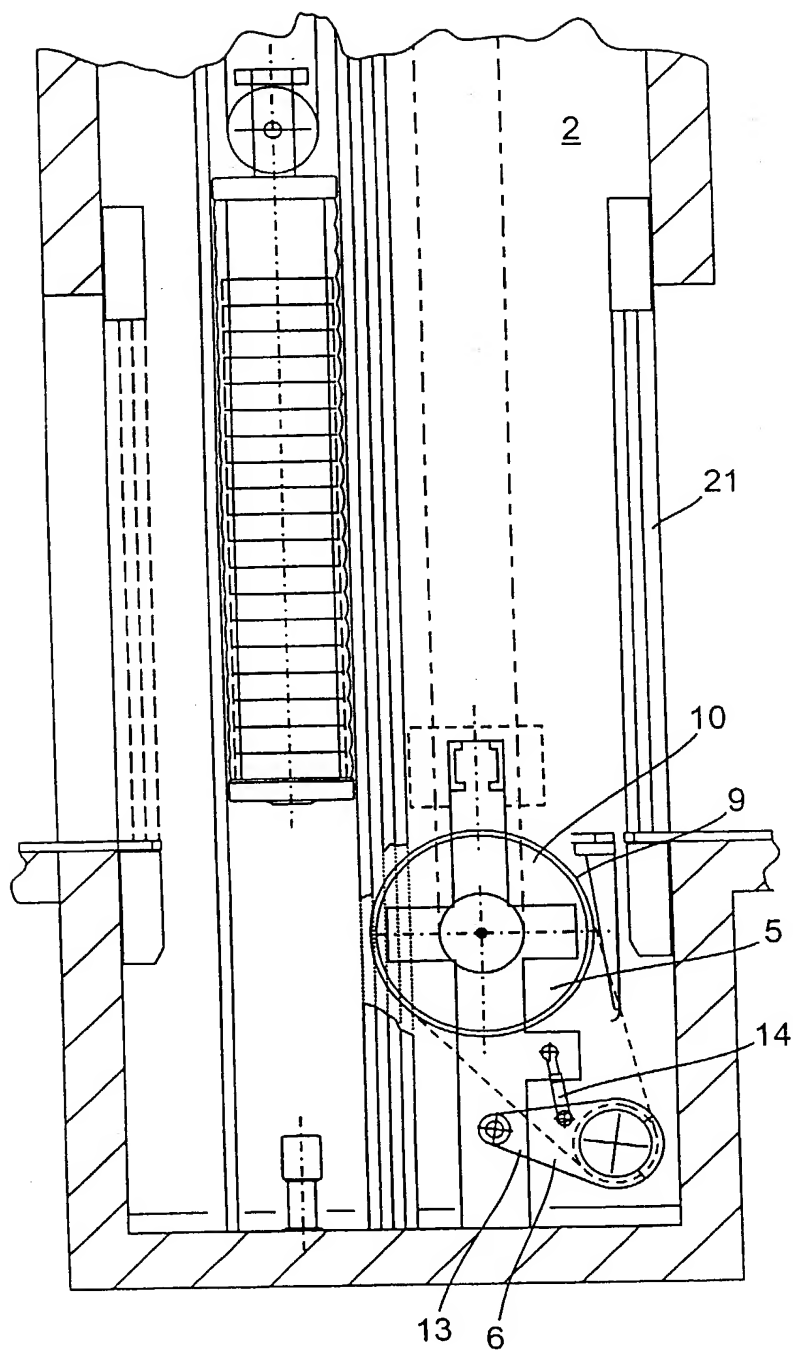


Fig. 9



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**COMBINED DECLARATION FOR PATENT APPLICATION**

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As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**Lift with a car attached to a support**

the specification of which (check only one item below):

☐  
☐

is attached hereto.

was filed as United States application  
Serial No.

on

and was amended

on (if applicable).

☒

was filed as PCT international application  
Number **PCT/EP00/09971**

on **October 10, 2000**

and was amended under PCT Article 19

on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application (s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

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Country (if PCT indicate „PCT“)	Application Number	Date of Filing (day, month, year)	Priority Claimed Under 35 USC 119	
DE	199 48 946.7	11.10.1999	<input type="checkbox"/> Yes	<input type="checkbox"/> No
			<input type="checkbox"/> Yes	<input type="checkbox"/> No
			<input type="checkbox"/> Yes	<input type="checkbox"/> No
			<input type="checkbox"/> Yes	<input type="checkbox"/> No

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U.S. Application No.	U.S. Filing Date		Patented	Pending	Abandoned
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PCT Application No.	PCT Filing Date	U.S. Serial Nos. Assigned (if any)			

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



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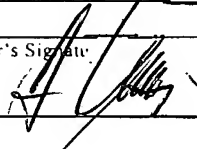
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Full Name of Sole or First Inventor	Inventor's Signature <b>x</b>	Date
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